code generating means for generating spreading codes to be allocated to the channels, wherein each of the spreading codes is selected on the basis of a data rate of the data part and the control part and spreading codes are selected so that two consecutive pairs of the I and Q data are correspondent to two points located on the same point or symmetrical with respect to a zero point on a phase domain; and

spreading means for spreading the control part and the data part by using the spreading code, to thereby generate the channel-modulated signal.

A1 Cont

84. (New) The apparatus as recited in claim 83, wherein the spreading code includes an orthogonal variable spreading factor OVSF) code.

85. (New) The apparatus as recited in claim 84, wherein said channel coding means includes:

spreading factor generation means for generating a spreading factor related to the data rate of the data part.

86. (New) The apparatus as recited in claim 84, wherein said code generating means includes:

control means responsive to the spreading factor, for generating code numbers for the channels; and

spreading code generation means responsive to the spreading

factor and the code number, for generating the spreading code to be allocated to the channels.

87. (New) The apparatus as recited in claim 85, wherein said spreading code generation means includes:

counting means for consecutively producing a count value in synchronization with a clock signal;

first spreading code generation means responsive to the count value and the spreading factor for generating the spreading code to be allocated to the data channel; and

B1 cont

second spreading code generation means responsive to the count value and the spreading for generating the spreading code to be allocated to the control channel.

A1 cont

88. (New) The apparatus as recited in claim 87, wherein the first spreading code generation means includes:

first logical operation means responsive to the count value for carrying out a logical operation with the spreading factor and the code number related to the data part, to thereby generate the spreading code related to the data part; and

first selection means for outputting the spreading code related to the data part in response to a select signal as the spreading factor related to the data part.

89. (New) The apparatus as recited in claim 87, wherein the

second spreading code generation means includes:

second logical operation means responsive to the count value for carrying out a logical operation with related to the control part, to thereby generate the spreading code related to the control part; and

second selection means for outputting the spreading code related to the control part in response to a select signal as the spreading factor related to the control part.

B' Cont.

90. (New) The apparatus as recited in claim 89, wherein said second logical operation means receives a code number of $I_7I_6I_5I_4I_3I_2I_1I_0$, a count value of $B_7B_6B_5B_4B_3B_2B_1B_0$ and a predetermined spreading factor.

91. (New) The apparatus as recited in claim 90, wherein the second logical operation means carries out a logical operation of

$$\prod_{i=0}^{N-2} {}^{\oplus} I_i \bullet B_{N-1-i}$$ if the predetermined spreading factor is 2^N

where N is 2 to 8.

92. (New) The apparatus as recited in claim 87, wherein said first logical operation means receives a code number of

$I_7I_6I_5I_4I_3I_2I_1I_0$, a count value of $B_7B_6B_5B_4B_3B_2B_1B_0$ and a predetermined spreading factor.

93. (New) The apparatus as recited in claim 92, wherein the first logical operation means carries out a logical operation of

$$\prod_{i=0}^{N-2} \oplus I_i \bullet B_{N-1-i}$$ if the predetermined spreading factor is 2^N where N is 2 to 8.

B1 cont.

A1 cont

94. (New) The apparatus as recited in claim 9, wherein said counting means includes an 8-bit counter when the 2^N is a maximum spreading factor.

95. (New) The apparatus as recited in claim 10, wherein said counting means includes an 8-bit counter when the 2^N is a maximum spreading factor.

96. (New) The apparatus as recited in claim 93, wherein said first and second logical operation means include a plurality of AND gates and a plurality of exclusive OR gates, respectively.

97. (New) The apparatus as recited in claim 96, wherein said

first and second selection means include a multiplexer, respectively.

98. (New) The apparatus as recited in claim 86, wherein said mobile station includes at least one data channel and a control channel.

99. (New) The apparatus as recited in claim 98, wherein said mobile station includes two, three, four, five or six data channels.

B cont

100. (New) The apparatus as recited in claim 98, wherein the control part is allocated to the control channel and the spreading code allocated to the control channel is represented by $C_{256,0}$, and wherein 256 denotes the spreading factor and 0 the code number.

101. (New) The apparatus as recited in claim 100, wherein the spreading factor related to the data part is 2^N where N = 2 to 8 and wherein the code number related to the data part is $2^N/4$ and wherein the data part is allocated to the data channel.

102. (New) The apparatus as recited in claim 86, wherein said code generating means further includes:

signature generation means for generating a predetermined signature; and

scrambling code generation means for generating a scrambling code.

103. (New) The apparatus as recited in claim 102, wherein the code numbers related to the data part and the control part are dependent on the predetermined signature, if the scrambling code is shared by multiple mobile stations and wherein the data part and the control part are allocated to the data channel and the control channel, respectively.

104. (New) The apparatus as recited in claim 103, wherein the spreading factor related to the control part is 256 and wherein the code number related to the control part is 16(S-1)+15 where S = 1 to 16 and S is the predetermined signature.

105. (New) The apparatus as recited in claim 104, wherein the spreading factor related to the data part is 2^N where N = 5 to 8 and wherein the code number related to the data part is $2^N(S-1)/16$.

106. (New) The apparatus as recited in claim 83, further comprising:

scrambling means for scrambling the data and control parts and a scrambling code, to thereby rotate the two points and generates scrambled signals.

107. (New) The apparatus as recited in claim 106, further comprising:

filtering means for pulse-shaping the scrambled signals and generating pulse-shaped signals; and

gain adjusting means for adjusting gain of each of the pulse-shaped signals.

108. (New) The apparatus as recited in claim 106, wherein one of the two points is rotated to clockwise direction and the other is rotated to counterclockwise direction by a phase of 45°, respectively.

B1 Cont

A1 Cont

109. (New) The apparatus as recited in claim 108, wherein a phase difference between the rotated points is 90°.

110. (New) The apparatus as recited in claim 99, wherein the spreading codes allocated to the first and second data channels are represented by $C_{4,1} = \{1, 1, -1, -1\}$, respectively.

111. (New) The apparatus as recited in claim 110, wherein the spreading codes allocated to the third and fourth data channels are represented by $C_{4,3} = \{1, -1, -1, 1\}$, respectively.

112. (New) The apparatus as recited in claim 111, wherein

the spreading codes allocated to the fifth and sixth data channels are represented by $C_{4,2} = \{1, -1, 1, -1\}$, respectively.

113. (New) A mobile station for converting source data to a channel-modulated signal having a plurality of pairs of in-phase (I) and quadrature-phase (Q) data, wherein the mobile station uses N number of channels where N is a positive integer (N is equal to or lager than two), the mobile station comprising:

Ent.

channel coding means for encoding the source data to generate (N-1) number of data parts and a control part;

code generating means for generating N number of spreading codes to be allocated to the channels, wherein each of the spreading codes is selected on the basis of a data rate of each data part and the control part and the spreading codes are selected so that two consecutive pairs of the I and Q data are correspondent to two points located on the same point or symmetrical with respect to a zero point on a phase domain; and

A1 cont

spreading means for spreading the control part and the data parts by using the spreading codes, to thereby generate the channel-modulated signal.

114. (New) The mobile station as recited in claim 113, wherein the spreading code includes an orthogonal variable spreading factor (OVSF) code.

115. (New) The mobile station as recited in claim 114, further comprising:

central processing unit coupled to said channel coding means;

user interface means coupled to the central processing unit for receiving a user input data from a user; and

source data generation means coupled to said channel coding means for generating the source data.

B1 Cont.

116. (New) The mobile station as recited in claim 115, further comprising:

frequency converting means coupled to said spreading means for converting the channel-modulated signal to a radio frequency signal; and

antenna for sending the radio frequency signal to a base station.

117. (New) A method for converting source data to a channel-modulated signal having a plurality of pairs of in-phase (I) and quadrature-phase (Q) data in a mobile station, wherein the mobile station uses N number channels (N is equal to or larger than two), the method comprising the steps of:

a) encoding the source data to generate at least one data part and a control part;

b) generating spreading codes to be allocated to the channels,

wherein each of the spreading codes is selected on the basis of a data rate of the data part and the control part and spreading codes are selected so that two consecutive pairs of the I and Q data are correspondent to two points located on the same point or symmetrical with respect to a zero point on a phase domain; and

c) spreading the control part and the data part by using the spreading code, to thereby generate the channel-modulated signal.

118. (New) The method as recited in claim 117, wherein the spreading code includes an orthogonal variable spreading factor (OVSF) code.

119. (New) The method as recited in claim 117, wherein said step a) includes the steps of:

a1) encoding the source data to generate the data part and the control part; and

a2) generating a spreading factor related to the data rate of the data part.

120. (New) The method as recited in claim 119, wherein said step b) includes the steps of:

b1) generating code numbers for the channels in response to the spreading factor; and

b2) generating the spreading code to be allocated to the channels in response to the spreading factor and the code number.

121. (New) The method as recited in claim 120, wherein said mobile station includes a data channel and a control channel for PRACH application.

122. (New) The method as recited in claim 120, wherein said step b2) includes the steps of:

b2-a) producing a count value in synchronization with a clock signal; and

B1 cont.

b2-b) carrying out a logical operation with the spreading factor and the code number related to the data part and the control part in response to the count value, to thereby generate the spreading code related to the data part.

A1 cont.

123. (New) The method as recited in claim 122, wherein the code number and the count value are represented by an 8-bit signal of $I_7I_6I_5I_4I_3I_2I_1I_0$ and an 8-bit signal of $B_7B_6B_5B_4B_3B_2B_1B_0$, respectively.

124. (New) The method as recited in claim 123, wherein the logical operation is accomplished by $\prod_{i=0}^{N-2} \oplus I_i \bullet B_{N-1-i}$ if the spreading factor is 2^N where N is 2 to 8.

125. (New) The method as recited in claim 120, wherein the mobile station includes at least one data channel and a control channel.

126. (New) The method as recited in claim 125, wherein the mobile station includes two, three, four, five or six data channels.

B1 cont.

127. (New) The method as recited in claim 125, wherein the control part is allocated to the control channel and the spreading code allocated to the control channel is represented by $C_{256,0}$, and wherein 256 denotes the spreading factor and 0 the code number.

A1 cont

128. (New) The method as recited in claim 127, wherein the spreading factor related to the data part is 2^N where N = 2 to 8 and wherein the code number related to the data part is $2^N/4$ and wherein the data part is allocated to the data channel.

129. (New) The method as recited in claim 121, wherein said step b) further includes the steps of;

b3) generating a predetermined signature; and

b4) generating a scrambling code.

130. (New) The method as recited in claim 129, wherein the

code numbers related to the data part and the control part are dependent on the predetermined signature, if the scrambling code is shared by multiple mobile stations and wherein the data part and the control part are allocated to the data channel and the control channel, respectively.

131. (New) The method as recited in claim 130, wherein the spreading factor related to the control part is 256 and wherein the code number related to the control part is 16(S-1)+15 where S = 1 to 16 and S is the predetermined signature.

132. (New) The method as recited in claim 131, wherein the SF related to the data part is 2^N where N = 5 to 8 and wherein the code number related to the data part is $2^N(S-1)/16$.

133. (New) The method as recited in claim 117, further comprising the step of:

d) scrambling the data and control parts and a scrambling code, to thereby rotate the two points and generate scrambled signals.

134. (New) The method as recited in claim 133, further comprising the steps of:

e) filtering the scrambled signals and generating pulse-shaped signals; and

f) adjusting gain of the pulse-shaped signals.

135. (New) The method as recited in claim 117, wherein one of the two points is rotated to clockwise direction and the other is rotated to counterclockwise direction by a phase of 45°, respectively.

136. (New) The method as recited in claim 135, wherein a phase difference between the rotated points is 90°.

137. (New) The method as recited in claim 136, wherein the spreading codes allocated to the first and second data channels are represented by $C_{4,1} = \{1, 1, -1, -1\}$, respectively.

A1 concl.

138. (New) The method as recited in claim 136, wherein the spreading codes allocated to the third and fourth data channels are represented by $C_{4,3} = \{1, -1, -1, 1\}$, respectively.

139. (New) The method as recited in claim 138, wherein the spreading codes allocated to the fifth and sixth data channels are represented by $C_{4,2} = \{1, -1, 1, -1\}$, respectively.

140. (New) The apparatus as recited in claim 85, wherein said mobile station includes a data channel and a control channel for PRACH application. --